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Neurocognitive Effects of Decentering on Self-Management Behaviors in Caregivers of the Critically Ill

To counter the known detrimental effects of caregiving and dysregulation of the analytic and emotional neural processing networks, we will evaluate a theoretically-derived **A**daptive **S**en**S**or-Based **I**ntervention for Caregiver **S**elf-Managemen**T** (ASSIST) that leverages advancements in wearable sensor technology and cloud computing to deliver on demand mindfulness-based stress reduction (MBSR), as well as health promotion (sleep hygiene and physical activity) strategies to optimize the caregiver's health. This next-generation self-management app, ASSIST, offers an opportunity to innovatively acquire biophysical sensor data from caregivers to deliver an adaptive intervention in real-time. The ASSIST intervention has two components that address analytic and emotion neural processing: MBSR and directed strategies to promote sleep quality and physical activity. All subjects exposed to the ASSIST intervention will wear the sensor-based technology for 30 days and receive a daily dose of MBSR. Biophysical sensor data (blood pressure, heart-rate variability, pedometry, and actigraphy) will be continuously acquired and analyzed using anomaly detection and machine learning techniques to vary the dose intensity (number of doses per day) of the two components of ASSIST adding a real-time, adaptive feature to promote caregiver self-management.

Our study model, consistent with the over-arching framework of the SMART Center, posits that effective caregiver self-management, the volitional acts to promote the caregiver's health, is predicated on the balance between analytic and emotional neural processing. We hypothesize that the ASSIST intervention will improve analytic neural processing by improving self-monitoring through directed prompted health promotion behaviors. ASSIST will expose subjects to MBSR and offers an opportunity for subjects to experientially gain self-awareness that will aid the regulation of their emotional neural processing, influenced by improvements in decentering, resulting in changes in the proximal outcomes (emotional distress, physical activity, and sleep quality). These improvements in the proximal outcomes and decentering are postulated to enhance a set of distal health outcomes among caregivers.

To test these hypotheses we will conduct a pilot randomized controlled trial (RCT) to examine the ASSIST intervention compared to an attention control condition on the among 20 first-time caregivers of chronically critically ill patients discharged to an extended care facility (ECF). We will collect mixed methods data, at baseline and on Days 7, 15, and 30 after the subject's enrollment to describe changes in a set of proximal and distal outcomes across two months. We aim to:

1. Determine whether there are differences in the distal outcomes [psychological burden (anxiety, depression, caregiver burden, HRQoL), cardiovascular health (BP and HRV) and economic costs between subjects who were exposed to ASSIST compared to those exposed to the attention control condition.
2. Examine whether decentering, self-efficacy, decision-making, motivation, caregiver activation, and perceived stress mediate the relationship between exposure to a self-management condition (ASSIST vs. attention control) and the proximal outcomes [stress reduction behaviors, sleep hygiene behaviors, and physical activity].
3. Determine if social support and demographics (gender and age) moderate the proximal outcomes [emotional distress, sleep quality, and physical activity] or distal outcomes [psychological burden (anxiety, depression, caregiver burden, HRQoL), cardiovascular health (BP and HRV) and economic costs].
4. Explore the differences in brain activation (structural and fMRI scans) and HPA function and stress response (hair cortisol, inflammation panel) between subjects exposed to ASSIST compared to those exposed to the attention control condition.